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10/716,386	11/18/2003	Nilanjan Mukherjee	2003P54686 US	4414

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Siemens Corporation
Intellectual Property Department
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EXAMINER	
DAY, HERNG DER	

ART UNIT	PAPER NUMBER
2128	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/716,386	MUKHERJEE, NILANJAN	
	Examiner	Art Unit	
	HERNG-DER DAY	2128	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 October 2010 and 18 November 2010*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-4,6-9 and 11-14* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4,6-9 and 11-14* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *10 April 2007* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. This communication is in response to Applicant's Amendment and Response ("Amendment") to Office Action dated August 18, 2010, filed October 15, 2010, and RCE filed November 18, 2010.

1-1. Claims 1, 6, 9, and 11-14 have been amended. Claims 1-4, 6-9, and 11-14 are pending.

1-2. Claims 1-4, 6-9, and 11-14 have been examined and rejected.

Claim Objections

2. Claim 9 is objected to because the "further further configured" as recited in lines 1-2 of the claim should be "further configured". Appropriate correction is required.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 1-4 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

4-1. Claim 1 recites the limitation, "the model" in line 4 of the claim which is vague and indefinite because it is unclear whether "the model" is referred to "a model" as recited in line 1 of the claim or "a model" as recited in line 2 of the claim. Clarification of the metes and bounds,

via clearer claim language, is requested. Dependent claims 2-4 are rejected as being dependent on a rejected claim.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1-4, 6-9, and 11-14 are rejected under 35 U.S.C. 102(b) as being anticipated by Blacker, U.S. Patent 5,315,537 issued May 24, 1994 (IDS 1, filed June 24, 2004).

6-1. Regarding claim 1, Blacker discloses a method for smoothing a mesh of a model, comprising:

loading, in a data processing system, a model having a plurality of interconnected nodes forming a mesh (the generated quadrilateral mesh representation of the geometric region as illustrated in FIGS. 12(A)-12(D), column 6, lines 11-13);

receiving a selection of a *node* of the model (The paving boundary smooth step 131 … is limited to nodes on the current paving boundary that are not part of the permanent boundary. … Defining V_i as a vector from the origin to a *node* N_i and assuming that N_i is attached to n elements, column 12, lines 30-42);

determining a nodal valency of the selected node (N_i is attached to *n elements*, column 12, lines 39-42);

determining an element connectivity pattern of the selected node (quadrilateral element, FIG. 12(b); the generated *quadrilateral mesh representation* of the geometric region as illustrated in FIGS. 12(A)-12(D), column 6, lines 11-13);

performing a smoothing operation on the selected node according to the nodal valency and the element connectivity pattern to produce a smoothed mesh of the model at the selected node (paving boundary smooth step 131, column 12, lines 30-68); and

storing the model (the generated quadrilateral mesh representation of the geometric region, column 6, lines 11-13; stored at least in the RAM).

6-2. Regarding claim 2, Blacker further discloses wherein

if the element connectivity pattern is a triangle, then incenter-based smoothing is performed;

if the element connectivity pattern is a quad-only mesh (a mesh of *all quadrilateral elements* for a geometric region of an arbitrary geometry, column 5, lines 43-46), then isoparametric-Laplace smoothing is performed (a modified isoparametric smooth, column 12, lines 30-33; A modified length-weighted Laplacian smoother is used, column 14, lines 1-5);

if the element connectivity pattern is a mapped region, then equipotential smoothing is performed; and

if the element connectivity pattern is a free-mixed mesh, then combined incenter and laplacian smoothing is performed.

6-3. Regarding claim 3, Blacker further discloses wherein the smoothing of the node is performed using

$$P_i' = \sum_{n=1}^{N} F_n(C,V) * \Omega_n(C,V)$$

and wherein i is the node to be smoothed, i is connected to N elements, Pi' is the new position of node i, Fn is the variational weight factor for n-th element Ωn is the positional function for n-th element, C denotes the connectivity pattern of the node, and V indicates the valency of the node (column 12, equation [19]).

6-4. Regarding claim 4, Blacker further discloses comprising performing an interior angle screening process (If the expansion ratio and interior angle are both greater than threshold values, column 16, lines 10-14).

6-5. Regarding claim 6, Blacker discloses a data processing system comprising:

a processor (CPU 10, FIG. 1); and

an accessible memory (RAM 20, FIG. 1), the data processing system configured to perform the steps of

loading a graphic model having a plurality of interconnected nodes forming a mesh (the generated quadrilateral mesh representation of the geometric region as illustrated in FIGS. 12(A)-12(D), column 6, lines 11-13);

receiving a selection of a node of the graphic model (The paving boundary smooth step 131 … is limited to nodes on the current paving boundary that are not part of the permanent boundary. … Defining V_i as a vector from the origin to a *node* N_i and assuming that N_i is attached to n elements, column 12, lines 30-42);

determining a nodal valency of the selected node (N_i is attached to *n elements*, column 12, lines 39-42);

determining an element connectivity pattern of the selected node (quadrilateral element, FIG. 12(b); the generated *quadrilateral mesh representation* of the geometric region as illustrated in FIGS. 12(A)-12(D), column 6, lines 11-13);

performing a smoothing operation on the selected node according to the nodal valency and the element connectivity pattern to produce a smoothed mesh of the model at the selected node (paving boundary smooth step 131, column 12, lines 30-68); and

storing the model (the generated quadrilateral mesh representation of the geometric region, column 6, lines 11-13; stored at least in the RAM).

6-6. Regarding claim 7, Blacker further discloses wherein

if the element connectivity pattern is a triangle, then incenter-based smoothing is performed;

if the element connectivity pattern is a quad-only mesh (a mesh of *all quadrilateral elements* for a geometric region of an arbitrary geometry, column 5, lines 43-46), then isoparametric-Laplace smoothing is performed (a modified isoparametric smooth, column 12, lines 30-33; A modified length-weighted Laplacian smoother is used, column 14, lines 1-5);

if the element connectivity pattern is a mapped region, then equipotential smoothing is performed; and

if the element connectivity pattern is a free-mixed mesh, then combined incenter and laplacian smoothing is performed.

6-7. Regarding claim 8, Blacker further discloses wherein the smoothing of the node is performed using

$$Pi' = \sum_{n=1}^{N} Fn(C,V) * \Omega n(C,V)$$

and wherein i is the node to be smoothed, i is connected to N elements, Pi' is the new position of node i, Fn is the variational weight factor for n-th element Ωn is the positional

function for n-th element, C denotes the connectivity pattern of the node, and V indicates the valency of the node (column 12, equation [19]).

6-8. Regarding claim 9, Blacker further discloses configured to perform the step of performing an interior angle screening process (If the expansion ratio and interior angle are both greater than threshold values, column 16, lines 10-14).

6-9. Regarding claims 11-14, these machine-readable medium claims recite equivalent method limitations as in claims 1-4 and are anticipated using the same analysis of claims 1-4.

Applicant's Arguments

7. Applicant argues the following:

7-1. CLAIM REJECTION UNDER 35 U.S.C. § 112, second paragraph

(1) "To accommodate the Examiner, the independent claims have been amended to specify that the model has a plurality of interconnected nodes, as illustrated in the Figures." (Page 8, paragraph 2, Amendment)

7-2. CLAIM REJECTION UNDER 35 U.S.C. §101

(2) "Claim 1 is amended to specify that the mesh of the model is smoothed at the selected node, and the model is stored in a data processing system." (Page 9, paragraph 2, Amendment)

7-3. CLAIM REJECTION UNDER 35 U.S.C. §102

(3) "Blacker doesn't receive a selection of a node, and doesn't determine valency for a selected node." (Page 13, paragraph 1, Amendment)

(4) "While the relevant passages describe rows of quadrilateral elements, nothing in Blacker teaches or suggests determining an element connectivity pattern of the selected node, as claims." (Page 13, paragraph 3, Amendment)

(5) "As Blacker does not teach or suggest determining nodal valency or element connectivity patterns, any smoothing performed by Blacker is not done according to the nodal valency and the element connectivity pattern, as claimed." (Page 13, paragraph 5, through page 14, paragraph 1, Amendment)

Response to Arguments

8. Applicant's arguments have been fully considered.

8-1. Applicant's argument (1) is persuasive. The rejections of claims 1-4, 6-9, and 11-14 under 35 U.S.C. 112, second paragraph, in Office Action dated August 18, 2010, have been withdrawn.

8-2. Applicant's argument (2) is persuasive. The rejections of claims 1-4, 6-9, and 11-14 under 35 U.S.C. 101 in Office Action dated August 18, 2010, have been withdrawn.

8-3. Applicant's argument (3) is not persuasive. Blacker discloses in column 12, lines 12-42, "essentially after every modification to the mesh, a smoothing step 130 is used to restore and maintain element size, perpendicularity, and overall paving boundary and mesh smoothness. … The paving boundary smooth step 131 is a modified isoparametric smooth that is limited to nodes on the current paving boundary that are not part of the permanent boundary. … Defining V_i as a vector from the origin to a node N_i and assuming that N_i is attached to n elements, V_{mj}, V_{mk} and V_{ml} are vectors from the origin to nodes N_j, N_k and N_l of the m^{th} element, respectively." In other words, Blacker discloses in the smooth step 131 N_i is the selected node which is not part of the permanent boundary and n elements attached to N_i is the determined valency for the selected node N_i. Applicant's independent claims have not specified how the valency for a

selected node is determined. Therefore, Blacker's defining V_i as a vector from the origin to "a node N_i and assuming that N_i is attached to n elements" anticipates the argued limitation.

8-4. Applicant's argument (4) is not persuasive. Blacker discloses in Abstract, "The automated quadrilateral surface discretization method and apparatus automatically generates a mesh of all quadrilateral elements which is particularly useful in finite element analysis." In other words, the element connectivity pattern has been predetermined as a quad-only mesh by mesh generation. Applicant's independent claims have not specified how the element connectivity pattern is determined. Therefore, Blacker's automatically generates "a mesh of all quadrilateral elements" anticipates the argued limitation.

8-5. Applicant's argument (5) is not persuasive. Blacker does disclose determining nodal valency and element connectivity patterns as detailed in paragraphs **8-3** and **8-4** above. Furthermore, Blacker discloses in column 12, lines 30-46, "The paving boundary smooth step 131 is a modified isoparametric smooth that is limited to nodes on the current paving boundary that are not part of the permanent boundary. … Defining V_i as a vector from the origin to a node N_i and assuming that N_i is attached to n elements, V_{mj}, V_{mk} and V_{ml} are vectors from the origin to nodes N_j, N_k and N_l of the m^{th} element, respectively. The nodes must be in a clockwise or counterclockwise order around the element. A new vector V'_i from the origin to the proposed new location of the node N_i is given by the equation: equation [19]". In other words, Blacker discloses the proposed new location of the node N_i (i.e., after smoothing) is given from equation [19] and equation [19] is based on nodal valency (i.e., n) and element connectivity pattern (i.e., V_{mj}, V_{mk} and V_{ml} are vectors from the origin to nodes N_j, N_k and N_l of the m^{th} quadrilateral element) which anticipates the argued limitation.

Conclusion

9. Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Herng-der Day whose telephone number is (571) 272-3777. The Examiner can normally be reached on 9:00 - 17:30.

Any inquiry of a general nature or relating to the status of this application should be directed to the TC 2100 Group receptionist: (571) 272-2100.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Kamini S. Shah can be reached on (571) 272-2279. The fax phone numbers for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Herng-der Day/
Examiner, Art Unit 2128

November 19, 2010

/David Silver/
Primary Examiner, Art Unit 2128